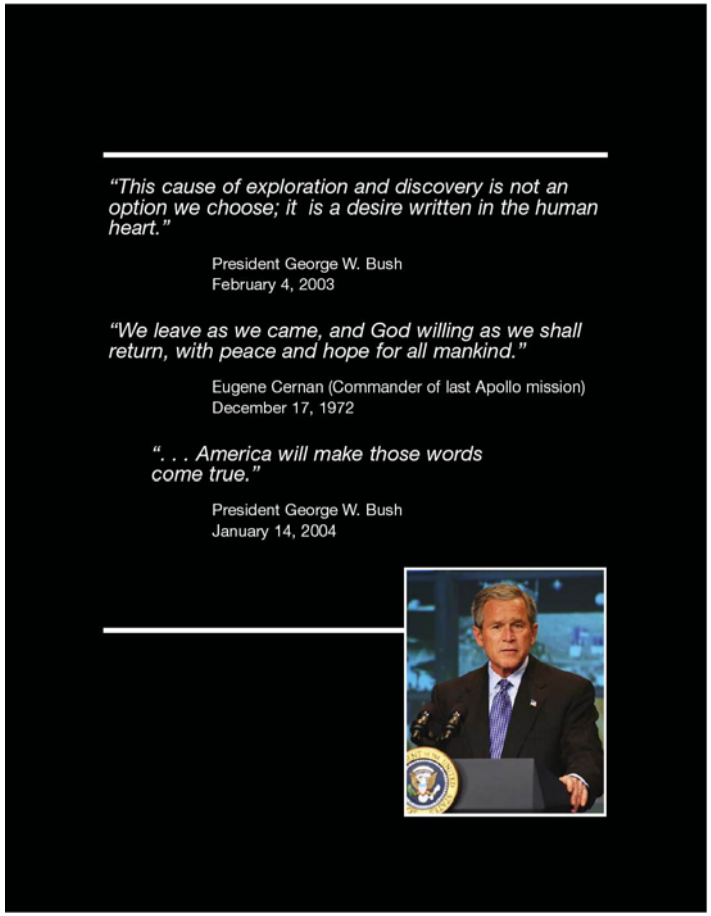
Office of Exploration Systems

The New Exploration Initiative
Program Overview

March 31, 2004

Deputy Associate Administrator,
Office of Exploration Systems
Doug Cooke

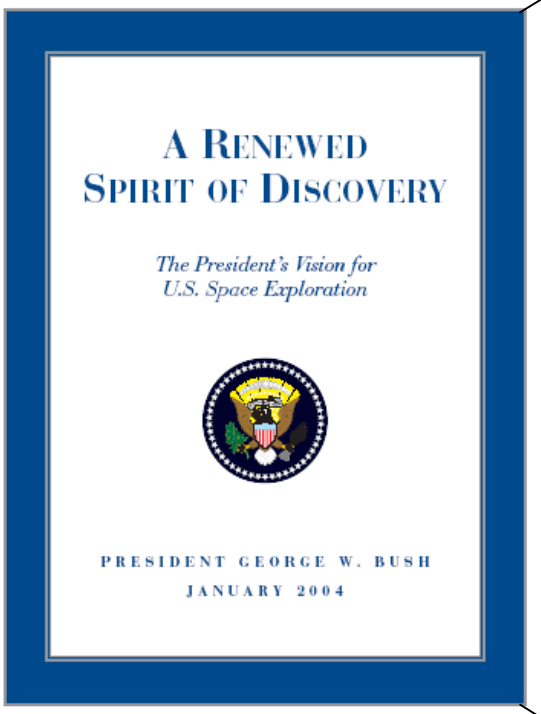
A New Future for U.S. Civil Space Programs



- On January 14, 2004, President Bush articulated a new Vision for Space Exploration in the 21st Century
- This Vision encompasses a broad range of human and robotic missions, including the Moon, Mars and destinations beyond
- It establishes clear goals and objectives, but sets equally clear budgetary 'boundaries' by stating firm priorities and tough choices
- It also establishes as policy the goals of pursuing commercial and international collaboration in realizing the new vision

Nation's Vision for Space Exploration

THE FUNDAMENTAL GOAL OF THIS VISION IS TO ADVANCE U.S. SCIENTIFIC, SECURITY, AND ECONOMIC INTEREST THROUGH A ROBUST SPACE EXPLORATION PROGRAM



Implement a sustained and affordable human and robotic program to explore the solar system and beyond

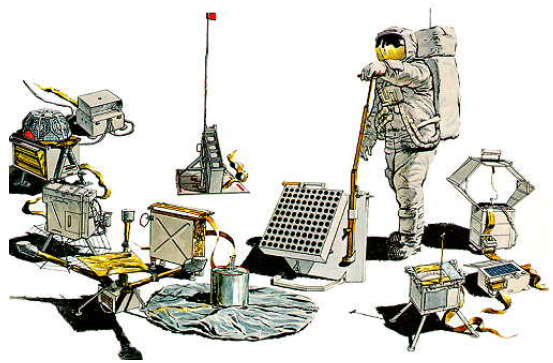
Extend human presence across the solar system, starting with a human return to the Moon by the year 2020, in preparation for human exploration of Mars and other destinations;

Develop the innovative technologies, knowledge, and infrastructures both to explore and to support decisions about the destinations for human exploration; and

Promote international and commercial participation in exploration to further U.S. scientific, security, and economic interests.

Key Elements of the Nation's Exploration Vision

- **Objectives**
  - Implement a sustained and affordable human and robotic program
  - Extend human presence across the solar system and beyond
  - Develop supporting innovative technologies, knowledge, and infrastructures
  - Focus ISS research to support exploration goals
  - Robotic exploration of Mars to prepare for future expedition
  - Use lunar activities to further science, and test approaches for exploration to Mars & beyond
  - Human Expedition to Mars
  - Promote international and commercial participation in exploration
- **Major Milestones**
  - 2008: Initial flight test of CEV
  - 2008: Launch first lunar robotic orbiter
  - 2009-2010: Robotic mission to lunar surface
  - 2011 First Unmanned CEV flight
  - 2014: First crewed CEV flight
  - 2015-2020: First human mission to the Moon
  - 2012-2015: Jupiter Icy Moon Orbiter (JIMO)/Prometheus



Realizing the Future
Earth, Moon, Mars, and Beyond

Foster and sustain the exploration culture across generations

- Open new frontiers
- Continuing and inspiring
- A constant impetus to educate and train

Identify, develop, and apply advanced technologies to…

- Enable exploration and discovery
- Allow the public to actively participate in the journey
- Translate the benefits of these technologies to improve life on Earth

Harness the brain power

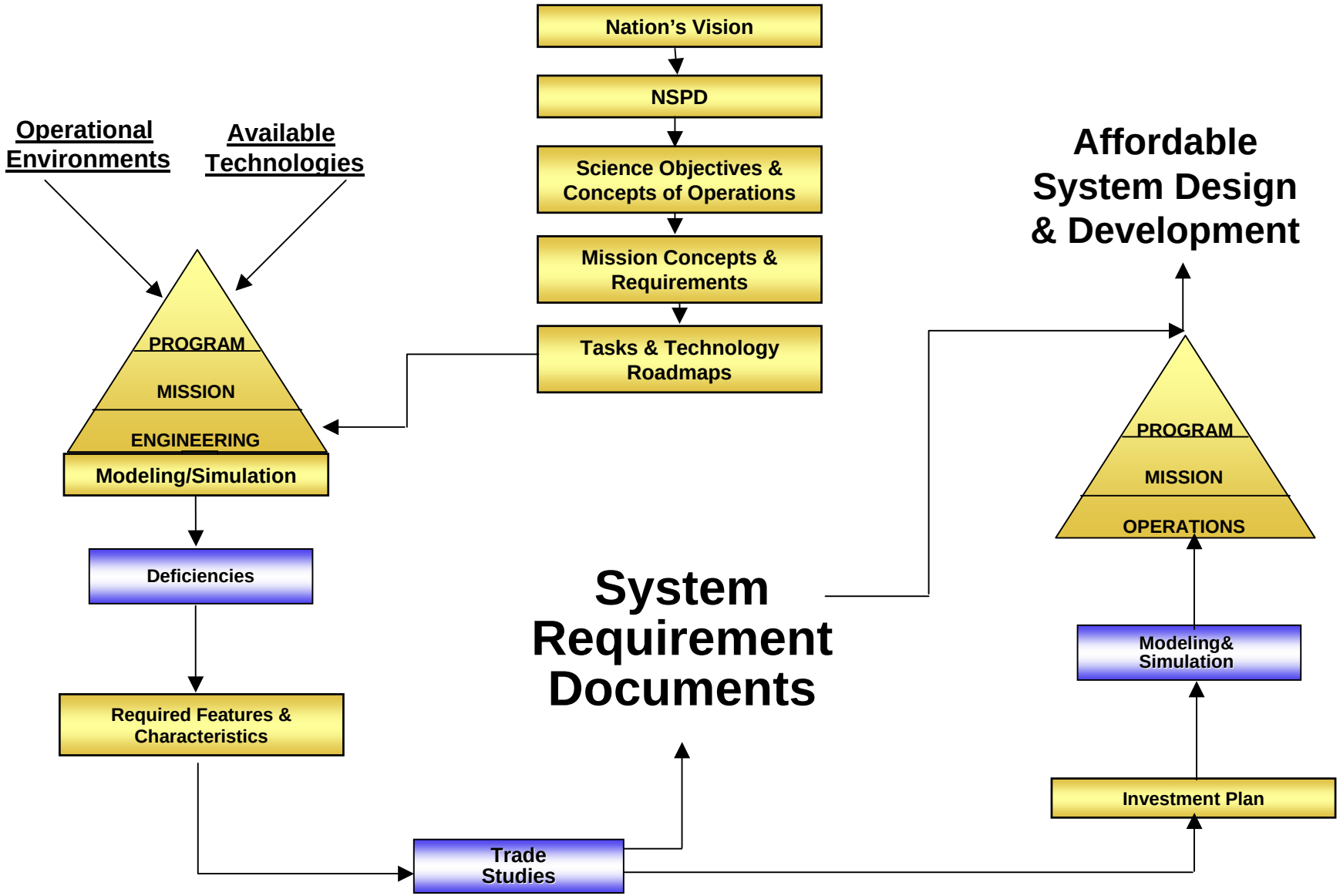
- Engage the nation’s science and engineering assets
- Motivate successive generations of students to pursue science, math, engineering and technology
- Create the tools to facilitate broad national technical participation

Preparing for Mars Exploration

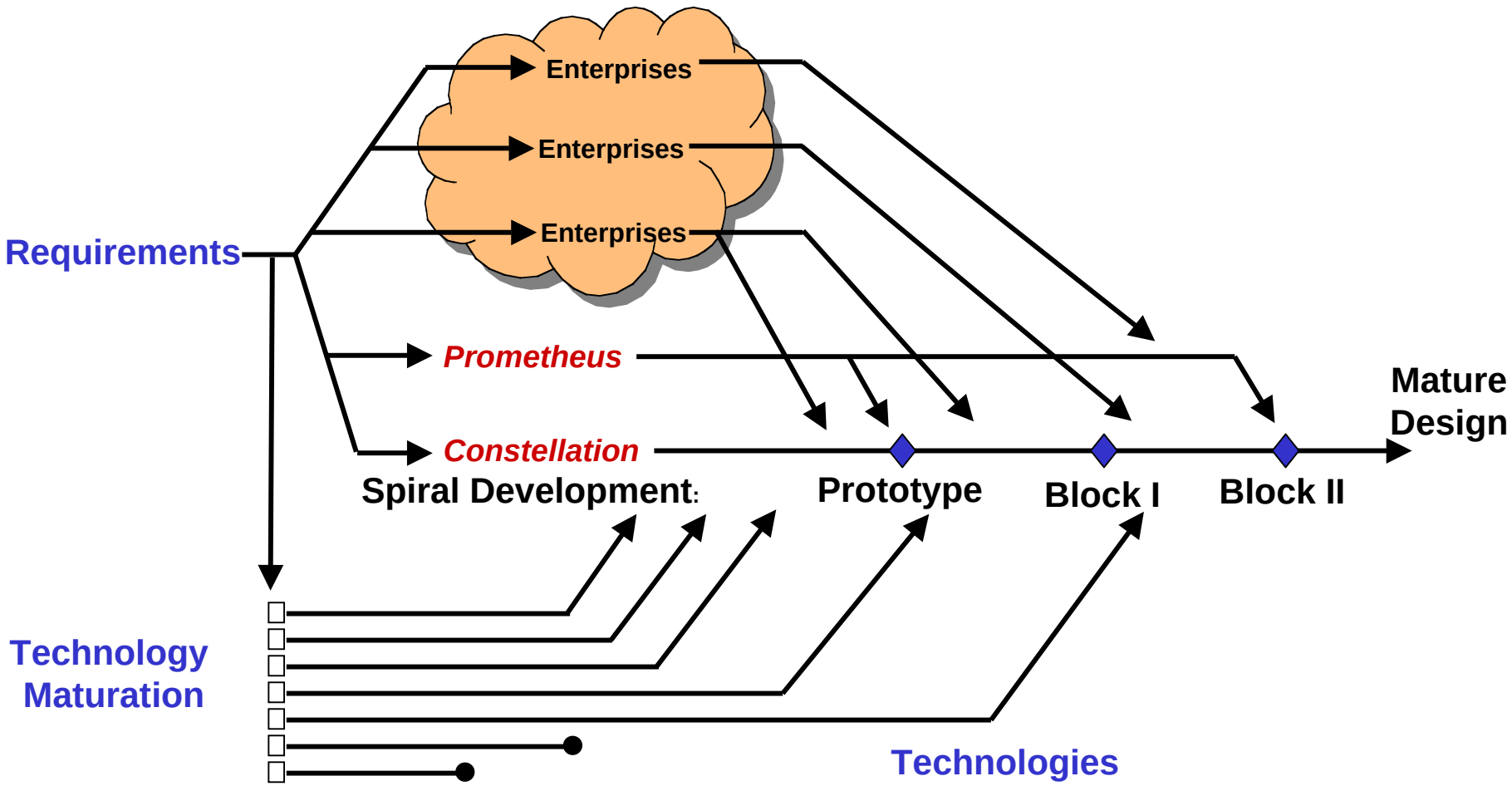
- **Moon as a test bed to reduce risk for future human Mars missions**
  - **Technology advancement** reduces mission costs and supports expanded human exploration
  - **Systems testing** and technology test beds to develop reliability in harsh environments.
  - **Expand mission and science surface operations** experience and techniques
  - **Human and machine collaboration**: Machines serve as an extension of human explorers, together achieving more than either can do alone
  - **Breaking the bonds of dependence on Earth**: (e.g./Life Science/Closed loop life support tests)
  - **Power generation and propulsion** development and testing
  - **Common investments** in hardware systems for Moon, Mars and other space objectives



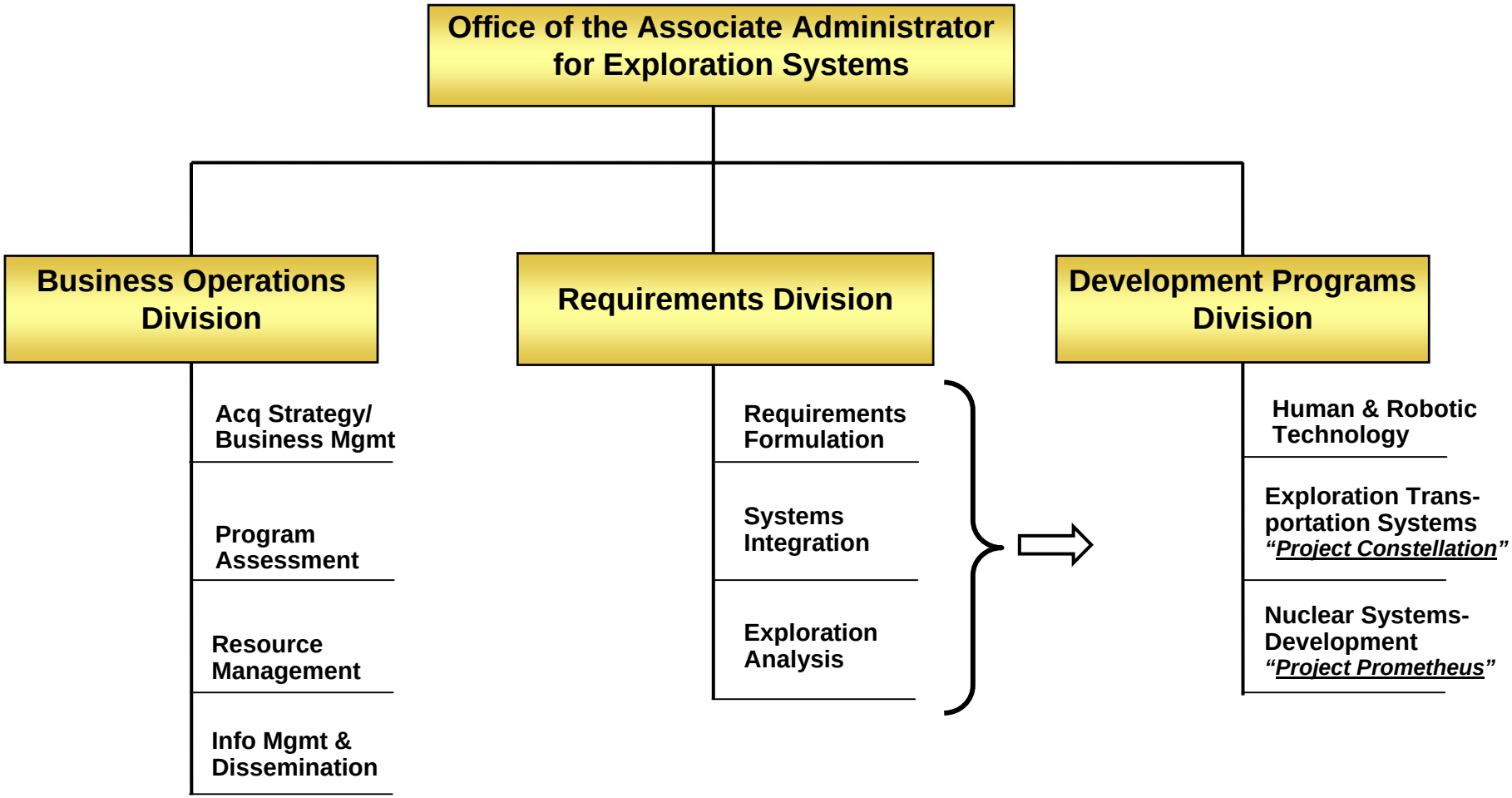

Strategy-to-Task-to-Technology Process



Requirements and Technology Investment Flow



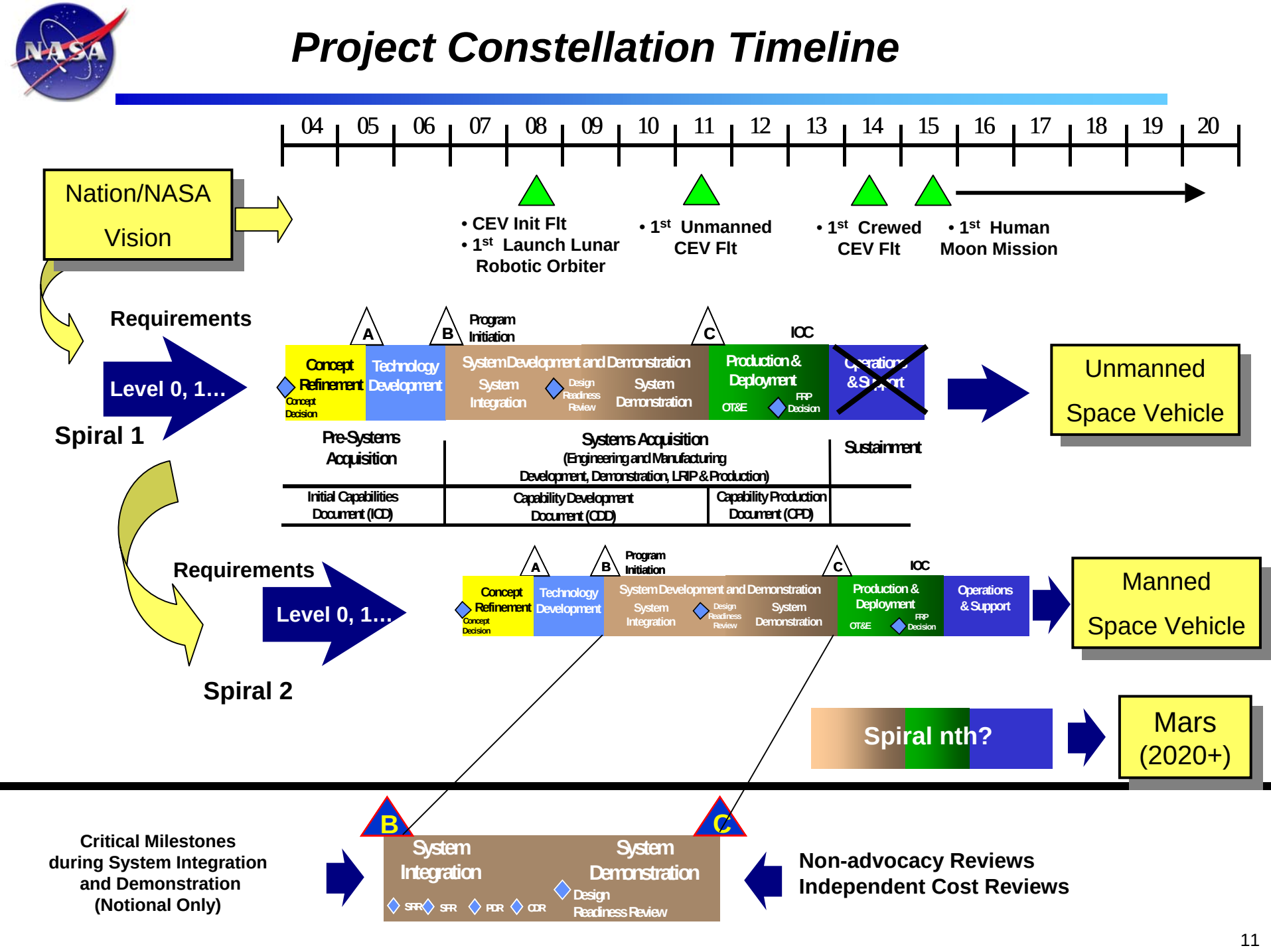
Office of Exploration Systems Organization



Constellation Architectural Components

- Robotic precursors
- Lift capability
- Crew transfer capability (CEV)
- Life support
- Scalable propulsion
- Tools
- Surface mobility
- Exploration Science Instrumentation
- Lander extensions
- Habitation
- Large structure transport
- Assembly
- Large scale power generation
- Communications infrastructure

Project Constellation Timeline



Constellation Program Acquisition Strategy Overview (Notional)

Pre MS A (BAA) JUN 04

Pre-MS A Concept Refinement JAN 05

MS A Tech Dev'mt TBD

MS B Program Initiation TBD

Design Readiness Review /Demo 2008

MS C Unmanned CEV Flight 2011

2015 (Objective)
2020 (Threshold)

OSP

NGLT

Target

Moon

Down Select

System Development & Integration

System Development & Demonstration

Tech Maturation

Prometheus

Centennial Challenges

Program of contests in which NASA will establish prize purses to stimulate innovation and competition in technical areas of interest to space exploration and ongoing NASA priorities.

- **Program Goals**
  - Stimulate innovation
  - Reach new communities
  - Help address technology pitfalls
  - Achieve returns that outweigh program investment
  - Educate, inspire and motivate the public

Office of Explorations System's FY04 Products

Requirements Division

- Crew Exploration Vehicle (CEV) Level 1 requirements and concepts of operations
- Lunar Orbiter and Lunar Lander Mission Level 1 requirements with supporting documentation
  - Technology guidelines, initial concepts, and use of existing hardware
- Prometheus Level 1 capability development requirements

Development Division

- Work Breakdown Structure (WBS) based on requirements for Exploration Systems
- Re-aligned Advanced Space Technology, Technology Maturation, and NGLT demonstration technology projects plus OSP and NGLT lessons-learned
- Investment Plan based on WBS gap analysis
- Single Acquisition Management Plan Framework to include:
  - Key Performance Parameters (KPPs), and Operational Thresholds and Objectives
  - Spiral Development Objectives and Milestones
  - Acquisition Strategy/Acquisition Program Baseline (APB)
  - Performance-Based measures for cost, schedule & performance
    - Integrated Baseline Reviews, EVMS tracking, Risk Analysis and Mitigation, Entrance/Exit Criteria…
- Industry concept studies
- Award Prometheus JIMO follow-on award

Office of Explorations System's FY04 Products (continued)

Business Operations Division

- Acquisition strategy & business formulation
  - Enterprise system single acquisition and management plan (SAMP)
- Resource management
  - Establish disciplined funds obligation & cost execution process
  - Match workforce competencies with mission needs
- Program assessment
  - Create integrated program & financial management module (EVMS)
- Information management & dissemination
  - Develop automated presentation archive & retrieval system, education plan, web site…
- Conduct several NASA / Industry Days
- Complete charter and first draft of Exploration Systems Master Plan
- Formulate / Implement / Enforce Broad Agency Announcement (BAA) Strategy

Office of Exploration Systems

We're not where we want to be,
We're not where we're going to be,
<u>BUT</u> we're certainly not where we were yesterday.

M.L. King, Jan '68